

# SERVER INSTALLATION

**After reading this chapter and completing the exercises you will be able to:**

- ◆ Make installation, hardware, and site-specific preparations to install Windows 2000 Server
- ◆ Install Windows 2000 Server using different methods, including from a CD-ROM, from the installation disks, over a network, unattended and from another operating system
- ◆ Go through a Windows 2000 server installation step by step, and test the installation
- ◆ Upgrade a Windows NT server and domain
- ◆ Create an emergency repair disk
- ◆ Install a service pack
- ◆ Troubleshoot installation problems and uninstall Windows 2000 Server

**W**indows 2000 Server is designed to install easily, as long as you have made the advance preparations described in the planning chapters of this book. Planning the file system, hardware implementation, network protocols, and Active Directory has a large payoff when you install Windows 2000 Server. To complement your advance planning, the installation follows a logical step-by-step process using a wizard to guide you from screen to screen. In most places, if you need to retrace one or more steps, there is an option to go back. Features of the installation wizard include automatic detection of hardware, drivers for a wide range of equipment, recommendations about what services to install, and the ability to customize the installation as needed.

In this chapter, you go through the advance preparations that apply directly to the installation process, including driver preparations, selecting a file system, selecting a protocol, partitioning disk storage, and other preparations. You learn about different installation approaches, for example over the network, from a CD-ROM, and using a floppy boot disk. You also install networking and optional server service software.

## INSTALLATION PREPARATIONS

As is true for any important undertaking, the Windows 2000 Server installation goes most successfully if you have made a few preparations. For example, the installation requires the following:

- Information about what hardware components are installed
- A determination of which file system to use
- Creation of an Administrator account
- The name of the server
- An installed NIC
- A determination of which protocols to install

Before you begin the installation, review the preparations in the sections that follow that affect your circumstances and consider recording preparation information and having it at your side for the installation.

## SERVER HARDWARE COMPONENTS

The most important step that you can take in preparing the hardware for installation is to carefully select the server components for your organization's needs and choose components that are on Microsoft's hardware compatibility list (HCL; see Chapter 2). Also, make sure your prospective server meets or exceeds the hardware system requirements provided in Chapter 2. After your hardware arrives, compile a list of hardware components such as computer type, monitor and adapter, SCSI adapters, keyboard type, hard disk drive capacity, CD-ROM drive and adapter, tape drive and adapter, and NIC information. Table 5-1 is an example of how you might prepare this information to have it available during the installation.

**Table 5-1** Server Hardware Component Information Form

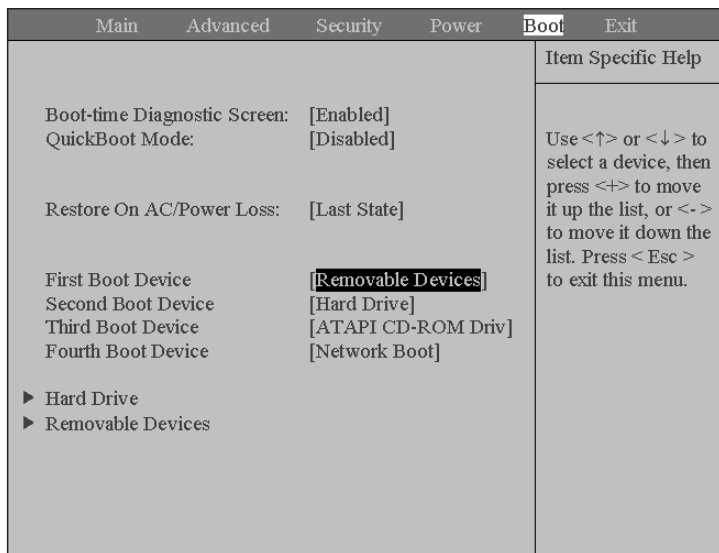
Hardware Component	Description
CPU type (Pentium, Pentium II, Pentium III, SMP, Xeon)	
Type of buses (ISA, PCI)	
Amount of RAM	
Hard disk and adapter type (manufacturer and model information)	
Hard disk capacity	
CD-ROM drive and adapter type (manufacturer and model information)	

**Table 5-1** Server Hardware Component Information Form (continued)

Hardware Component	Description
Mouse or pointing device	
Monitor and monitor adapter (manufacturer and model information)	
Keyboard type	
Floppy drive type	
Tape drive and adapter (manufacturer and model information)	
NIC (manufacturer, model, specifications)	

In addition to making a hardware list, check and record the **basic input/output system (BIOS)** configuration settings on the computer. The BIOS is a program on a read-only or flash memory chip that establishes basic communication with components such as the monitor and disk drives. The BIOS setup is accessed differently on each computer, for example by pressing F1, Delete, or some other key combination when the computer is booted. Most BIOS setup menus are character-based screens holding information about the BIOS version and manufacturer, hardware components, which drive to boot from first, drive statistics such as the size and number of cylinders per disk, floppy drive type, and so on. The main reason to check the BIOS setup prior to installing Windows 2000 is to check the boot drive order, because the BIOS setup program usually has an option to specify the order. This is the order in which the computer checks drives for an operating system boot sector. Most server administrators have the BIOS check drives in the following order: floppy drive, hard drive, and CD-ROM drive. If the floppy drives are empty, the computer boots from a hard drive, and if there is no hard drive, it boots from a CD-ROM drive. If you use the installation setup floppy disks and CD-ROM to install Windows 2000, then set the BIOS to boot first from the floppy. If you plan to install Windows 2000 Server directly from CD-ROM (if your computer supports a CD-ROM boot), change the order to boot from the CD-ROM drive first.

Also, it is possible for a computer to lose its setup information due to a defective battery or some other system problem. You can quickly restore the setup information if you have a record of the settings. Figure 5-1 is an example BIOS setup screen. Notice that the First Boot Device, “Removable Devices” on this particular screen, refers to the floppy drive, and the boot order is floppy drive, hard drive, CD-ROM drive, and network boot.



**Figure 5-1** BIOS setup screen

The key combination needed to start the BIOS setup is often displayed when the computer first boots up. After the installation is complete, make sure the boot drive order is set for floppy, hard, and CD-ROM drive, which provides more alternatives for using diagnostic tools later.

Another hardware preparation task is to make sure you have the most up-to-date drivers for hardware such as SCSI adapters, RAID drives, the NIC, and CD-ROM drives. The drivers usually are included on a floppy disk or CD-ROM that accompanies the hardware. If the drivers are not with the hardware, contact the manufacturer or obtain the drivers from a Web page. Place driver files on a floppy disk for easiest use during installation or obtain a CD-ROM from the hardware vendor. Microsoft includes many drivers on the Windows 2000 Server CD-ROM, but drivers for some hardware are not included or may not be the most current.



Even when these drivers are included on the Windows 2000 Server CD-ROM, it is prudent to obtain the latest drivers from the hardware manufacturers and use them during the installation or install them later (see Chapter 6) so that your server is working at its optimum when you let users on.

If you are installing on an SMP computer, obtain the most recent copy of the **hardware abstraction layer (HAL)** driver from the manufacturer. The HAL is a set of program routines used to control a specific hardware component from within the operating system kernel. Special HAL drivers may be needed to install Windows 2000 Server on a multi-processor SMP computer.



If you have a problem installing Windows 2000 Server after carefully selecting and preparing the server computer, it most likely will be related to a missing or out-of-date driver. Obtaining current drivers before you start the installation enables you to address this problem on the spot.

## MAKING DECISIONS BEFORE STARTING

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There are several decisions you need to make before starting the installation. If you wait to make the decisions until you are doing the installation, you may have to undo your choices later. The decisions you make in advance will save you time and make the installation go faster. Also, some decisions, such as the name of the server, may require input from a supervisor or management committee. The decisions you need to consider are the following:

- How to partition the disk
- What file system(s) to use
- What the server name will be
- What the password for the Administrator account will be
- What protocol(s) will be selected
- What licensing method will be used
- If the server will be a DC and what the domain name will be (or what the name is of an existing domain or workgroup the server will join)

### Disk Partition Selection

You have the option to partition the server hard disks for Windows 2000 Server only or for a combination of operating systems, such as MS-DOS and Windows 2000. **Partitioning** is a process in which a hard disk section or a complete hard disk is set up for use by an operating system. A disk can be formatted after it is partitioned. **Formatting** is an operation that divides a disk into small sections called tracks and sectors for the storage of files.

When you install Windows 2000, you can make decisions about how to partition the disk storage. Depending on what partitions exist already, you can:

- Use an existing partition
- Delete an existing partition and create a new one
- Create a new partition, if one does not exist

If you create a partition, you will need to specify its size to the setup program. Plan to make the partition for the system files no smaller than 685 MB for an Intel-based computer, and keep in mind that Microsoft recommends 2 GB as the minimum size.

Some server administrators like to create a **dual-boot system**, partitioning a few megabytes of disk space for MS-DOS (FAT). The reason for having an MS-DOS partition is to provide a way to boot the server and run diagnostic and repair utilities in case one or more Windows 2000 boot files are damaged due to a power problem or some other difficulty.



A Windows 2000 Server installation allows you to leave another operating system on the server to create a dual-boot system. Compatible operating systems are MS-DOS, Windows 3.x, Windows 95, and Windows 98. You can run only one operating system at a time. Also, FAT16 and FAT32 operating systems, such as MS-DOS and Windows 98, cannot view NTFS-formatted files without installing a special third-party utility for this purpose. In most cases, you will allocate only a few megabytes for FAT16 or FAT32, just enough for the operating system and to perform minimum functions.

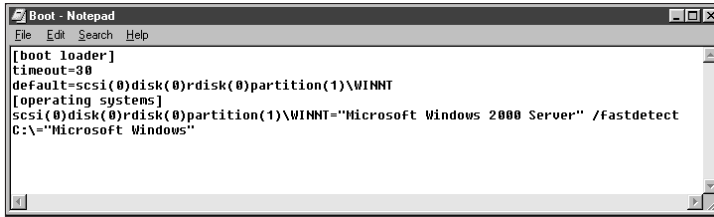
If you select to partition for FAT16/FAT32 and NTFS, plan to partition the FAT portion before starting the Windows 2000 installation. Use the MS-DOS FDISK utility to partition a FAT area and then use the MS-DOS FORMAT command to format the partition. Size the partition so that it will be large enough to hold the utility programs you need plus the MS-DOS or Windows 95/98 operating system files.

On a dual-boot system, the Windows 2000 boot loader is placed by the setup program on the system partition of the computer, such as drive C. The boot loader recognizes that there are two or more operating systems on that computer. When you boot, it displays a character-based screen that enables you to select which operating system you want to start. For example, if you have a dual-boot system using Windows 2000 Server and MS-DOS, then the menu on the screen shows both options.



Windows 2000 Server has a flexible disk management tool you can use after the system is installed. During installation, partition only what you need to for the Windows 2000 operating system files (and for a dual-boot system, if you use this alternative). You can use the Disk Management snap-in for the MMC to fully customize disk storage after Windows 2000 is installed.

The contents of the Windows 2000 boot loader menu are specified in the Boot.ini text file (see Figure 5-2), which is located in the root folder on the disk used to boot the computer, such as Drive C. The file is marked as read-only and may be hidden if Windows Explorer or My Computer is not set to view operating system files (change this property using the Tools menu, Folder Options, and View tab). To remove an operating system from the boot loader or edit its entry in the menu, you can edit Boot.ini manually, using Notepad or WordPad. Before you edit the file, remove its read-only designation (right-click the file, click Properties, and uncheck Read-only on the General tab). The file contains two sections: [boot loader] and [operating systems]. The [boot loader] section specifies a timeout value in seconds for selecting an operating system; the default operating system is booted if a selection is not made before the timeout value is reached. The [operating systems] section lists the operating systems that can be started, such as Windows 2000 Server and Windows 98.



**Figure 5-2** Boot.ini file

The operating system location for Windows 2000 Server is specified in terms of the Advanced RISC Computing (ARC) pathname. In Figure 5-2, the `scsi()` value shows that a SCSI drive (with BIOS disabled) is installed; the value inside the parentheses is determined by the SCSI driver. On a SCSI disk, the `disk()` value is the ID of the disk in the chain of devices connected to the SCSI adapter (counting from 0). The `rdisk()` value is usually for SCSI disks. `Partition()` is the number of the partition, which is 1 to 4 (counting from 1). If the ARC path starts with `multi()` instead of `scsi()`, this shows that a non-SCSI drive is installed (or a SCSI drive with BIOS enabled), which always has the value 0. The `disk()` value also is always 0 for non-SCSI drives, but reflects the ID for a SCSI drive with the BIOS enabled. For non-SCSI disks, the `rdisk()` value is always 0 or 1 (counting from 0) for single-channel controllers, which can have up to two disks; or it can be 0 to 3 for dual-channel controllers, which can have up to four disks attached. For example, the line:

```
multi(0)disk(0)rdisk(1)partition(1)\WINNT
```

would mean that the operating system is in folder `\WINNT` on a non-SCSI disk, `multi(0)disk(0)`; on the second disk in the channel path, `rdisk(1)`; and on the first partition of that disk, `partition(1)`. The line:

```
scsi(1)disk(2)rdisk(0)partition(1)\WINNT
```

would mean that the operating system is in folder `\WINNT` on a SCSI disk designated as 1 by its driver, `scsi(1)`; on the third disk in the SCSI chain, `disk(2)` (counting from 0); and on the first partition, `partition(1)` (counting from 1).

## Windows 2000 Server File Systems

In Chapter 1 you learned the differences between the FAT16, FAT32, and NTFS file systems. In nearly all installations, it is recommended that you install the more robust NTFS because it is meant for networking. NTFS offers the best security, performance, and file handling for network users. This is particularly true if you anticipate that the server will need to handle large files, such as databases. NTFS also has features such as encryption and file compression, which are not included with FAT16 or FAT32.



If a partition is set up for FAT and is 2 GB or smaller, Windows 2000 will format it as FAT16, and if it is over 2 GB, Windows 2000 will format it as FAT32.

## Server Name

Because the server name affects everyone who uses the server, consider soliciting input from a supervisor or management team. This helps ensure their support of the project, and it ensures that an appropriate name is selected. The server name is seen in Network Neighborhood and My Network Places on Windows 95/98 and Windows 2000, and in other network utilities. There are some general guidelines to consider when selecting a name:

- Use a name that is relatively short so it is easy to type.
- Make the name descriptive of the server's function or reflective of the organization that uses it.
- Select a name that is easy for everyone to remember and use.
- Make sure the name is not used already by another network computer.

If there are several servers on a network, develop a naming scheme, such as one that identifies servers by department, function, or location. For example, if one server is used by the accounting department, one by marketing, and another for research, you might name them ACCOUNT, MARKET, and RESEARCH. This is easier for users than if you name them SERVER1, SERVER2, and SERVER3. In a school with lab servers in the library, student union, and fine arts building, you might name them LIBRARY, UNION, and ARTS. These types of naming schemes are important to network administrators as well as to users. They make it easier to identify and manage servers on a network that may have 10, 20, or more servers.

## Administrator Account Password

At the time of installation, Windows 2000 Server creates a master account called the Administrator account. This account has access to all areas of the server, including security administration, file administration, and control of user accounts. The Administrator account also has permission to take ownership of any server resource. Entry into the Administrator account is controlled by a password that is established at the time the server is created. The password can be changed later, but it saves time to have a password ready before starting the installation. Select a password that is difficult to guess and avoid using information that can be identified with you, such as your nickname, favorite car, favorite food, or the name of a family member. A long password, for example 10 characters or more, is appropriate for this sensitive account. Windows 2000 Server accepts passwords up to 14 characters, and passwords are case-sensitive. Make sure you remember the password, because you will need it to log on to the Administrator account as soon as the operating system is installed.



Microsoft recommends that all users have a "strong password," which has the following characteristics: (1) is over seven characters long, (2) has a combination of letters, numbers, and symbols, and (3) includes at least one symbol in characters 2 through 6.



## Protocol Selection

As you learned in Chapter 3, you need to select a protocol to use for communicating on the network. NetBEUI is appropriate for small networks of 20 or 30 users that do not have routing or Internet connectivity. In most cases, plan to use TCP/IP, not NetBEUI. If the server will be used as a gateway to NetWare, you need to install Client Service for NetWare (CSNW) and NWLink for communication. Also, you will need to install Gateway Service for NetWare (GSNW) to set up and manage the gateway.



GSNW can be set up in Windows 2000 Server to link to any NetWare version, but if the corresponding NetWare server is version 5.x and uses TCP/IP, then the NetWare administrator will need to set up the IPX/SPX gateway software in NetWare.

Fortunately you do not need to make all of these decisions from the start. You can configure additional protocols after the server is set up. If you use the default protocol setup, Windows 2000 Server assumes that there is a DHCP server, which means you do not have to provide configuration information for TCP/IP. However, if you customize the TCP/IP setup, you will need an IP dotted decimal address for the server and a subnet mask. Obtain this from a network administrator. If you are the network administrator, you may keep a database that shows the next available address. If you are just starting out, contact a network professional or an Internet service provider for more information.



Some network administrators install Windows 2000 Server using the default TCP/IP setup with DHCP for convenience. Just after the installation, they disable DHCP and manually configure TCP/IP with permanent address information. By providing permanent information, they ensure that users can always access the server at the same address.

## Licensing Method

Windows 2000 offers two licensing methods: per server and per seat. In **per server licensing**, each server is granted a limited number of **client access licenses (CALs)**, which specify the number of clients that can be logged on at the same time. **Per seat licensing** involves purchasing a separate license for each client that will access the server. In larger settings, such as a company or university, where there are many servers, it may be more cost-effective to purchase a license for each workstation. This way, the licensed workstation is billed only for access to those servers where it has security authorization. However, in most smaller office settings where there is only one server, a server license for a set number of workstations makes more sense. By default, Windows 2000 Server usually includes five per server or per seat licenses out of the box.

## Network Access

When you install Windows 2000 Server, you can install it to be a new workgroup server, to join an existing workgroup, or to join an existing domain. As you learned in Chapter 1, you

can use peer-to-peer or server-based networking. In the peer-to-peer network model, you designate a new workgroup via the server or you designate that the server will join an existing workgroup. In this type of installation, Windows 2000 Server is a **standalone server**. You might use this selection on a very small network or when you are bringing Windows 2000 Server into an existing Windows NT Server 4.0 network in a context where it will not act as a domain controller (DC) and where you are not ready to implement the Active Directory. Another situation in which you would set up a standalone server is when there is no existing domain and you want to promote the server to be the first DC by installing the Active Directory services after the server is installed (see Chapter 4).

In the server-based model, you designate that the server will join an existing domain. The server can assume two roles in an existing domain: DC or member server. A **member server** belongs to a domain, but does not contain a copy of the Active Directory, does not replicate the Active Directory, and does not authenticate logons. A typical use of a member server is in a client/server operation where one server is used strictly to store the databases. The database server does not need to handle logon checking because the information it houses is accessed indirectly through software applications on a DC. A member server could also be dedicated to handling print, CD-ROM, or fax services. If you choose to join a domain as a DC or member server, make sure you have the domain name, a DC and DNS server connected to the network, and an account already created in the domain for the new server.

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## INSTALLATION OPTIONS

There are several ways to install Windows 2000 Server. The method you choose depends on the resources at your computer. For example, if the computer is not equipped with a CD-ROM drive, you can perform an installation over a network. No matter what method you select, you must have software licenses for the server and the number of users who will access the server. The primary installation methods are as follows:

- CD-ROM only
- Floppy disk and CD-ROM
- Network installation
- Installation from an existing operating system
- Unattended installation

The installation methods are described in the sections that follow. Each of the installation methods consists of techniques to boot the computer and to enable you to load the installation files. Even though the startup techniques vary, such as performing the installation from CD-ROM or over the network, in every case you start the setup by running either Winnt.exe (Winnt) or Winnt32.exe (Winnt 32). Winnt and Winnt32 perform the same function, but Winnt32 runs in the 32-bit Windows environment.

Winnt is used if your computer is already running MS-DOS, Windows 3.1, or Windows 3.11. Use Winnt32 if the computer is already loaded with Windows 95, Windows 98, Windows NT Server, Windows NT Workstation, or Windows 2000 (for an upgrade). There are several switches that can be used with either Winnt or Winnt32, as shown in Tables 5-2 and 5-3. Notice that the switches for Winnt are different from those used for Winnt32 (try Hands-on Project 5-1 to view Winnt32 switches).

For example, using Winnt, if you want to specify a location for the installation files that is different from the directory from which you start Winnt.exe, use the `/s` switch and specify the drive and directory after the switch, for example `Winnt /S:E:\I386`. When using Winnt32, you may want to check the computer to make sure it is compatible with Windows 2000 by using the `/checkupgradeonly` switch, or if you have trouble during the installation use the `/debug` switch to record errors in a file.

**Table 5-2** Command-line Switches for Winnt

Switch	Purpose
<code>/?</code>	Lists the switches for Winnt
<code>/a</code>	Initiates the accessibility options for those who have visual, hearing, or movement disabilities
<code>/e:command</code>	Executes a command after the Windows portion of the setup, for example to start a program or open the Control Panel
<code>/i:initialization filename</code>	Specifies that you are using an initialization file other than the default, Dosnet.inf (This initialization file shows where installation files are located)
<code>/r:foldername</code>	Creates an optional folder of files copied from the Windows 2000 Server CD-ROM (The folder remains after the installation is completed)
<code>/rx:folder</code>	Creates an optional folder of files copied from the Windows 2000 Server CD-ROM (the folder is deleted after the installation is completed)
<code>/s:drive:\folder</code> <code>/s:\\server\share\folder</code>	Uses a path for the installation files other than the current path
<code>/t:drive\folder</code>	Copies the temporary files used by the installation to a specified location (otherwise, they are copied to the target drive of the installation)
<code>/u:script file</code>	Used in an unattended installation to specify the name of the script or answer file containing installation commands and should be used with the <code>/s</code> command
<code>udf:id</code>	Enables a uniqueness database file to be used with an unattended installation as a way to ensure that particular information in the script can be changed, such as the name of the server ("id" specifies the name of the database file, for example <code>udf:install.dbf</code> )

Table 5-3 Command-line Switches for Winnt32

Switch	Purpose
<code>/?</code>	Lists the switches for Winnt32
<code>/checkupgradeonly</code>	Creates only a report to tell you if the computer is compatible with Windows 2000 (the report is called Upgrade.txt for computers running Windows 95/98, and Winnt32.log for computers running Windows NT 3.51 or 4.0)
<code>/cmd:command</code>	Executes a command before the Windows portion of the setup is completed and just after you have provided configuration information
<code>/comdcons</code>	Adds a Recovery Console option to the Boot.ini file so that you can fix problems with an installation
<code>/copydir:folder</code>	Creates a special subfolder in the final Winnt directory, usually implemented for information specific to that installation, for example to store specialized drivers for use only during the installation (the folder is retained after the installation is completed)
<code>/copysource:folder</code>	Creates a special subfolder in the final Winnt directory, usually implemented for information specific to that installation, for example to store specialized drivers for use during the installation or to store for later use (the folder is deleted after the installation is completed)
<code>/debug level:file</code>	Creates a file to help you debug installation problems, on the basis of the level you specify (Winnt32.log is the default if no file is specified; levels are 0 = major errors, 1 = errors, 2 = warnings, 3 = information, 4 = detailed information)
<code>/m:folder</code>	Enables you to install files from the default installation folders on the CD-ROM and from a folder you specify with the <code>/m</code> command — (if the installation finds two files of the same name, it uses the file in the folder specified by <code>/m</code> )
<code>/makelocalsource</code>	Copies the CD-ROM source files to the same disk that is designated for the Winnt folder (enabling you to later install additional services or components from your local hard disk)
<code>/noreboot</code>	Does not automatically reboot after files are copied to the hard disk, enabling you to run a command in the interim, for example to check the dates on driver files for the most current versions
<code>/s:drive:\folder</code> <code>/s:\\server\share\folder</code>	Uses a path for the installation files other than the current path — also enables you to copy files from two or more sources by specifying multiple <code>/s</code> commands
<code>/syspart:drive</code>	Enables you to copy the files used by setup to a hard drive, remove the hard drive, and install it in another computer (can be used by computer manufacturers, who install the first phase, but leave the second phase of the installation to the purchaser to specify parameters unique to her or his site such as the server name; must be used with <code>/tempdrive</code> )

**Table 5-3** Command-line Switches for Winnt32 (continued)

Switch	Purpose
/tempdrive:drive	Temporary files and the final Windows 2000 system files are copied to the drive specified, for example to drive D: in /tempdrive:D
/unattend	Enables you to upgrade a version of Windows 2000 to a later version, using the parameters already in place for your current version
/unattend [ <i>seconds</i> ]: <i>script file</i>	Used in an unattended installation to specify the name of the script file containing installation commands (the <i>seconds</i> parameter is used to create an interval between the time that the setup files are copied and the time that the computer reboots, so you can interrupt to enter a command)
udf: <i>id</i>	Enables a uniqueness database file to be used with an unattended installation so that particular information in the script can be changed, such as the name of the server ( <i>id</i> specifies the name of the database file, for example udf:install.dbf)

The Windows 2000 Server CD-ROM contains installation files in the \I386 folder for Pentium, Pentium Pro, Pentium II, and Pentium III computers using Intel, Cyrix, or AMD processors.

## CD-ROM Installation

If your computer supports booting from the CD-ROM drive, this method is the easiest because you only need the Windows 2000 Server CD-ROM to start the installation, and it is faster than the other methods. To start the installation from CD-ROM:

1. Make sure the computer's BIOS is set to boot first from the CD-ROM drive.
2. Insert the Windows 2000 Server CD-ROM in the CD-ROM drive.
3. Power off the computer.
4. Turn on the computer, allowing it to boot from the CD-ROM. On some computers you may be prompted to press Enter to boot from CD-ROM.
5. This method automatically starts Winnt.exe, and you follow the instructions on the screen.

Try Hands-on Project 5-2 to practice a CD-ROM installation.

## Floppy Disk and CD-ROM Installation

Another way to start the Windows 2000 Server setup is by using the four floppy setup disks and the Windows 2000 Server CD-ROM that accompany your purchase of Windows 2000 Server. This method is for those computers that cannot boot from CD-ROM. The steps to use this method are as follows:

1. Make sure the computer's BIOS is set to boot first from floppy drive A:.
2. Power off the computer.

3. Insert Setup Disk #1 into drive A and the CD-ROM into the CD-ROM drive.
4. Turn on the computer, allowing it to boot from Setup Disk #1.
5. This method automatically starts Winnt.exe, and you follow the instructions on the screen, such as inserting Setup Disk #2 next.



You can make copies of the floppy setup disks by: (1) formatting four floppy disks, (2) inserting the Windows 2000 Server CD-ROM, (3) clicking Start, Run, and entering the drive letter of the CD-ROM, plus the path \bootdisk\makeboot.exe or \bootdisk\makebt32.exe, (4) clicking OK, and (5) following the on-screen instructions.

## Network Installation

Network installation enables you to perform the Windows 2000 Server installation from a shared network directory on another computer. This method is useful if you have a diskless workstation or one that does not have a CD-ROM drive. Also, the method is useful if you operate a large network and plan to implement many Windows 2000 servers. The network installation can be fast (but usually not as fast as the CD-ROM installation), and you can arrange to install all of the servers in the same way.



Before you start, make sure you have an appropriate number of software licenses for the servers you create.

The network method requires a prospective server computer that is connected to the network and can access a shared drive, such as one running Windows 3.11, Windows 95, Windows 98, or Windows NT.

Follow these general steps to start a network installation:

1. Copy the installation files to the host computer that will offer the shared folder, such as an existing Windows 2000 server. To copy the files, first create the folder on the host computer, calling it, for example, \I386. Insert the Windows 2000 Server CD-ROM in the host computer and copy the files from the I386 folder on the CD-ROM.
2. Share the host's folder, giving it Read or Change share permissions.
3. To start the installation, map the prospective server computer to the shared folder. Run the Winnt.exe or Winnt32.exe program (depending on the operating system you used to boot the prospective server), using the switches that match your needs (see Tables 5-2 and 5-3).
4. Follow the instructions on the screen.

Hands-on Projects 5-3 and 5-4 enable you to practice a network installation.

## Installation from an Existing Operating System

You can run the Windows 2000 Server installation on a computer that already has a Microsoft-based operating system (MS-DOS or Windows 3.1 or higher) installed, such as one running Windows 98 or Windows NT. You might use this method to upgrade to Windows 2000 Server only or to have a dual-boot system. If you are upgrading to Windows 2000 Server only, simply delete the Windows 98 partition and create an NTFS partition as part of the installation process. If you want to have a dual-boot system, leave the Windows 98 FAT16 or FAT32 partition and create another partition for NTFS (make sure you have plenty of disk storage for NTFS first, for example by adding more disks). Use these steps to start this type of installation:

1. Boot the computer to use its current operating system, such as Windows 98.
2. Insert the Windows 2000 Server CD-ROM.
3. Click Start, click Run, and enter the drive letter of the CD-ROM followed by the appropriate installation command and switches, such as *D:\i386\winnt32 /debug4:debug.log*.
4. Follow the instructions on the screen. (If you originally booted the computer using Windows 95, Windows 98, Windows NT, or Windows 2000 Professional, the screens will all be in GUI format from the start.) The first dialog box asks you if you want to upgrade Windows 2000 or to install a new copy of Windows 2000. Use the upgrade option to replace the current operating system, but keep your existing settings and applications. Use the install new copy (clean install) option if you plan to have a dual-boot system or to install from scratch.



If you install Windows 2000 Server from MS-DOS, start the SMARTDRIVE utility before running Winnt.exe to enable the process to go faster.

## Unattended Installation

An unattended installation is usually performed via a network installation, but you specify a set of unattended parameters before the Windows 2000 Server installation begins. The parameters enable you to provide a script or **answer file**, which gives responses to questions that come up in the installation. No license agreement is presented during the unattended installation, because it is assumed that you have already read the license information and that you have the appropriate number of licenses for the total number of unattended installations.

You can perform an unattended installation using Winnt or Winnt32 and a combination of the /S switch and /U switch, as in the following example:

```
Winnt32 /s:\mainserver\I386 \unattend:unattend.txt
```

The /S: switch indicates where to find the installation files, such as on a network computer (/S:\server\share\folder) or in a local folder (/S:drive:\folder). The /unattend: switch provides the name of the answer file, Unattend.txt for example, for the unattended installation.

Unattend.txt is an actual answer file that is provided as an example, and is found in the \I386 folder on the Windows 2000 CD-ROM. You can use a text editor, such as Notepad, to edit the answer file or use the Setup Manager, which is the file Setupmgr.exe on the Windows 2000 CD-ROM or in the Windows 2000 Server Resource Kit available from Microsoft. Use the Start button Run option to start Setupmgr.exe, which initiates the Windows 2000 Server Setup Manager Wizard. Follow the steps in the Wizard to create an answer file. This file contains predetermined answers to questions asked by Windows 2000 Setup, including information about what file system to use, where to install the operating system files, and the name for the server. The following is an example of several answers that can be provided in the answer file (see the i386 unattend.txt file for more examples):

```
[Unattended]
Unattendmode = Fullunattended
OemPreinstall = No
TargetPath = WINNT
Filesystem = NTFS

[UserData]
Fullname = "Sara Martin"
Orgname = "Nishida and McGuire"
Computername = "Lawyer"
```

To further customize an unattended installation, you can create a **uniqueness database file (UDF)**. The UDF works in conjunction with the answer file, allowing you to create a unique answer set for each server setup. For example, the UDF might contain the server name. Each server would have a uniqueness ID in the database associated with its information. The uniqueness ID is specified by the `/UDF<uniqueness id>` command used with the Winnt or Winnt32 command.

An alternative to performing an unattended installation over the network is to use an answer file along with booting from CD-ROM. The answer file is created in the same way as the example Unattend.txt file, but after you create the file, name it Winnt.sif (an .sif file is called an image file) and copy it to a floppy disk. Also, the contents of the Winnt.sif answer file must have a section heading that starts with [Data] and under that section you specify the key code on the Windows 2000 Server CD-ROM case. Using this method, you follow these steps:

1. Set up the computer's BIOS to boot first from CD-ROM.
2. Insert the Windows 2000 CD-ROM and turn on the computer.
3. Immediately insert the floppy disk containing the Winnt.sif file as soon as you see the first text-based setup screen.
4. The Winnt.sif file controls how the setup runs from the CD-ROM in the unattended mode.

Yet another unattended option is to specify which Windows 2000 Server components, such as Management and Monitoring Tools, are to be installed during the graphical portion of the installation described later in the section, "Installation Part 2". You specify which components to install by creating a Cmdlines.txt file, which is used in conjunction with an answer file



and that contains a series of command lines to be executed. The `Cmdlines.txt` file must be located in a folder that you create, called `\$OEM$` that is placed on the shared network drive containing the installation files or on the floppy disk containing `Winnt.sif`. The command sequence in the `Cmdlines.txt` file begins with `[Commands]` and underneath that heading are placed the individual commands, one to each line, surrounded by quotes. The command lines are interrupted by a utility program, usually `Sysdiff.exe`, that comes with Windows 2000 Server. Consult the documentation for `Sysdiff.exe` or the command interrupter that you use to determine the exact command line syntax.

If you plan to duplicate multiple servers, so each is exactly like the other, Windows 2000 supports the `Sysprep.exe` program which is used to clone Windows 2000 on computers that have the same hardware characteristics. `Sysprep.exe` is available in the Windows 2000 Server Resource Kit, which can be obtained from Microsoft. This program is run from the Start button and Run option. Another utility in the Resource Kit is called `Syspart.exe`, which is intended for cloning computers that have different hardware configurations. When you use `Syspart.exe`, the target computer must already have Windows NT 4.0 installed so it can be upgraded to Windows 2000 Server.

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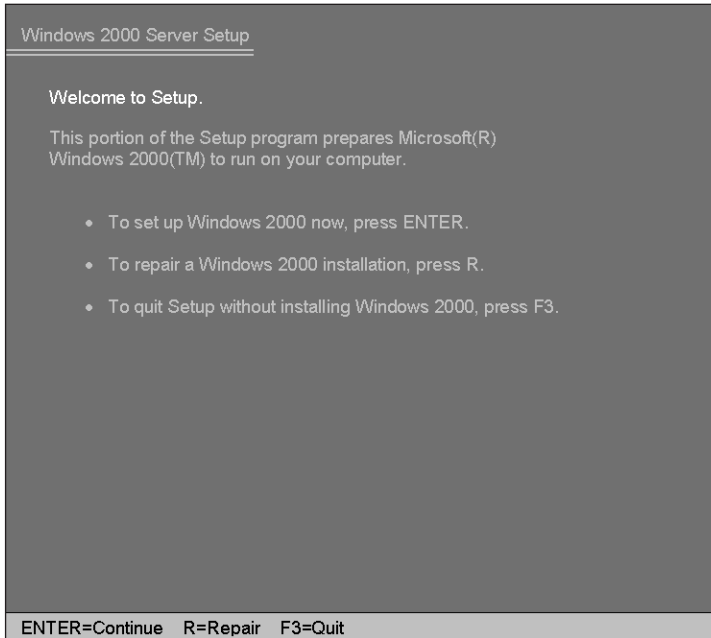
## STEPPING THROUGH AN INSTALLATION

Once you have gathered all your information and determined which options you will use to install Windows 2000 Server, you can proceed with the installation. The next sections outline an installation using the CD-ROM only method, but installations are nearly the same for all methods. The installation steps are divided into two parts. In the first part, text-based Setup screens are presented (these screens are graphical if you start by using `Winnt32` when a 32-bit operating system is already loaded on the computer). This part primarily focuses on detecting the hardware and loading installation files onto the computer. The second part is a graphical display that uses Windows-based dialog boxes that enable you to configure information specific to the server, such as the Administrator account password, the server name, and network access.

### Installation Part 1

After you start `Winnt`, as detailed earlier in the section “CD-ROM Installation,” Setup goes through the following stages:

1. Setup inspects the hardware configuration and loads the drivers and other files to get started. Next, Windows 2000 Server Setup provides a screen with three options: to set up Windows 2000, to repair an existing Windows 2000 installation, and to quit Setup (see Figure 5-3). Press Enter to begin the installation, but also make a note that you can later access the repair option at any time. The repair option enables you to access diagnostic and repair functions on the emergency repair disk (discussed later in this chapter).
2. Setup presents the licensing agreement for Windows 2000 Server. Use the Page Down key to read the agreement and when you are finished reading, press F8 to indicate that you agree.



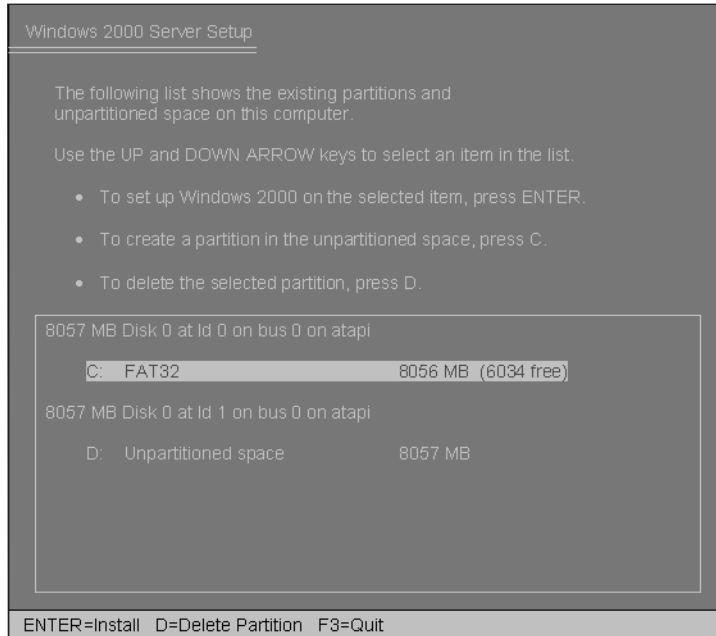
**Figure 5-3** Beginning setup options



Setup provides a way to install a special mass storage driver or HAL, in case the Windows 2000 Server CD-ROM does not contain the driver, or in case Setup cannot find storage devices when it inspects the computer. Press F6 as soon as possible when Setup begins inspecting the hardware. Setup provides a special screen that enables you to install new drivers. Press S, insert the driver disk, and press Enter. Also, if Setup does not recognize the type of computer because it is an SMP computer, obtain a HAL driver from the vendor, press F5 as soon as possible when Setup starts, select Other in the menu, and install the HAL driver from a floppy disk or CD-ROM.

3. Setup scans the hard drive(s) to determine if there are any previous versions of Windows 2000 Server. If it finds one, you have the choice to repair it if it is damaged or to install a new copy of Windows 2000 over the current version. If you see this screen, press Esc to install a new copy.
4. The hard drive scan also determines if any FAT16, FAT32, or NTFS partitions are already in place. Use the up and down arrow keys to select the unpartitioned space or an existing partition on which to install Windows 2000 and press Enter. Figure 5-4 illustrates this screen on a two-disk system that already has a FAT32 partition. If you highlight an unpartitioned space, the control key options change and you should press C to create the partition. Setup displays another screen to confirm the selection and enables you to specify the size of the partition. If you choose to write over an existing partition, press Enter, and Setup displays a warning screen on which you can enter C to continue. If you choose to delete

an existing partition, press D. If the partition you are deleting is the one from which the computer boots, Setup displays another screen from which you press Enter to delete the partition. If the partition is not one from which your computer boots, press L on the next screen to delete it. The original screen reappears, showing the drive is now unpartitioned.



**Figure 5-4** Detecting partitions

5. Use the up and down arrow keys to select a file system, NTFS or FAT (a third option is to leave the existing file system, if the drive is already formatted) and then press Enter. On the next screen, Setup warns that files will be deleted, if you are formatting over an existing partition (on some systems the warning notice may appear on the format selection screen). Press F to format the partition. Or, if you change your mind at this point, press Esc to go back and select a different partition. After you start the format, a screen is displayed to show the progress of the format.
6. After the disk is formatted, Setup automatically checks the disks, copies files, and reboots into the Windows 2000 graphical mode. If your computer is set up to boot first from CD-ROM, depending on the computer, you may need to remove the Windows 2000 Server CD-ROM before it reboots and then put the CD-ROM back in after it reboots.

## Installation Part 2

Once the computer reboots, you make selections with a mouse or pointing device by clicking buttons, such as Back and Next, at the bottom of dialog boxes. The Back button enables you to go to previous screens to change your selections, and the Next button is used to move to the next step in the installation process.

The steps of the setup from this point are as follows:

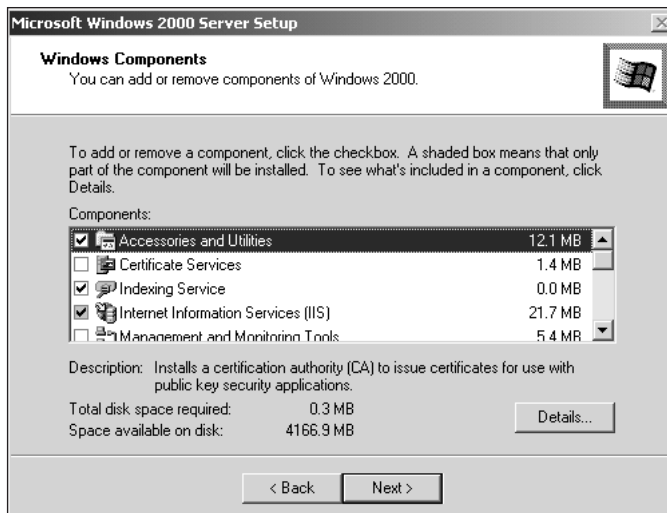
1. The first dialog box is used to gather information about the computer, which includes the keyboard, and pointing device. Click Next. An action bar in the next dialog box shows you the progress of the detection process and automatically goes to the following dialog box when it finishes.
2. In the next dialog box, you have options to change regional and keyboard settings, for instance to customize the server to use a specific language or to customize a language for your locale. For example, you may set up to use English, but want to use the United Kingdom locale English. Complementing the language you can customize number, currency, time, and date formats. Use the Customize buttons to make adjustments, and then click Next.
3. Enter your name and the name of your organization in the Personalize Your Software dialog box (see Figure 5-5). Click Next.
4. Enter the Product Key. You can find the key on a sticker attached to the reverse side of the Windows 2000 Server CD-ROM jewel case.



**Figure 5-5** Name and organization information

5. In the Licensing Modes dialog box, select the licensing mode (per server or per seat) and enter the number of licenses. You can add licenses later as needed, so only add the number of licenses you have now. Click Next.

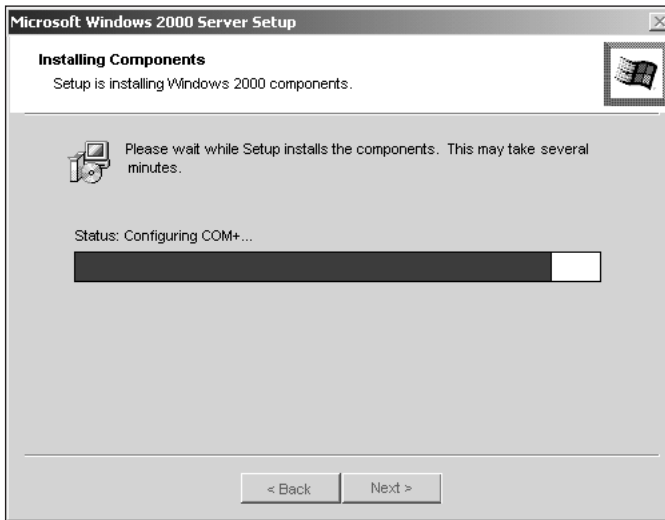
6. Enter the name of the computer and provide a password for the Administrator account. Confirm the password and click Next.
7. Enter checks in the boxes of the components that you want to install (Figure 5-6), such as Accessories and Utilities, Management and Monitoring Tools, Message Queuing Services, and Other Network File and Print Services (for UNIX and Macintosh). When you first install Windows 2000 it is recommended that you select only the services you need immediately and install others later, to minimize configuration difficulties. For example, you might install Management and Monitoring Tools and Message Queuing Services now, because you will likely use these right away. To view information about a particular component, click the component name and then click Details. Click Next after you have made the selections.



**Figure 5-6** Windows 2000 components

8. If there is a modem installed in the server, the Modem Dialing Information dialog box is displayed. Provide your region and country information, telephone area code, number you dial for an outside line (optional), and telephone line type (tone or pulse) in the Modem Dialing Information dialog box. This information is used to establish dial-up networking. Click Next.
9. Verify the accuracy of the date and time in the Date and Time Settings dialog box and make any needed changes. Also, make sure the time zone is correctly set, for example for Mountain Time. Click Next.
10. Setup next displays a dialog box to show that it is configuring your network settings, and then enables you to select typical or custom settings. Click Typical settings if you want to use Client for Microsoft Networks, File and Print Sharing for Microsoft Networks, and TCP/IP. Otherwise click Custom settings to establish a different setup, for example to install NWLink for NetWare connectivity. To keep the installation simple, it is recommended that you use the typical settings and make adjustments later. Click Next after you have made your selection.

11. If the computer is not currently on a network or if you want to specify a workgroup for the computer, click the No radio button, or click Yes if the computer will join a domain. Enter the workgroup or domain name in the text box. Click Next. If you join a domain, you will need to enter the domain account and the password of the account you already created to enable the server to join the domain.
12. Setup now installs the components you have specified (see Figure 5-7), sets up Start menu items, and removes the temporary files created by the installation process.
13. Remove the Windows 2000 Server CD-ROM, click Finish, and restart the computer.



**Figure 5-7** Installing components

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## TESTING THE NEW SERVER

When the new server restarts, a logon screen appears with a message to press the Ctrl+Alt+Del keys at the same time. The Ctrl+Alt+Del combination is used to start the logon screen and does not reboot the server. Press the keys, enter Administrator as the account name and enter the password you supplied during the installation. A dialog box is displayed to enable you to configure the server (see Figure 5-8). Minimize the dialog box when you first log on, because you will learn how to configure the server in the next chapter. The Windows 2000 Server desktop appears, as shown in Figure 5-9.



Figure 5-8 Configuration dialog box

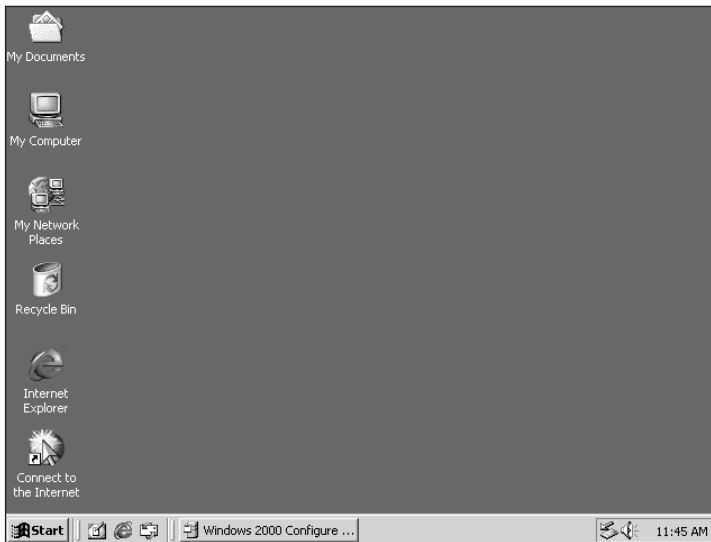


Figure 5-9 Windows 2000 desktop

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## UPGRADING A WINDOWS NT 4.0 SERVER AND DOMAIN

You can use steps similar to those described in the previous sections to upgrade a Windows NT 4.0 Server to Windows 2000 Server, with the option of retaining security settings, account information, group information, and the domain. Use the following guidelines to upgrade the Windows NT server and the corresponding Windows NT domain:

1. Coordinate a time when you can upgrade the server and domain when no one is accessing it but you.
2. Back up each Windows NT 4.0 server that will be upgraded, including its Registry, before you start an upgrade. Also, make an emergency repair disk before you start and again just after you finish (see the next section to learn how to create an emergency repair disk for Windows 2000 Server).
3. If you are upgrading more than one server in a domain, start by upgrading the Windows NT 4.0 primary domain controller (PDC; see Chapter 4) to be converted to the first Windows 2000 domain controller (DC). Next, and one at a time, upgrade each Windows NT 4.0 backup domain controller (BDC) to be a Windows 2000 domain controller (or some can be upgraded to member servers, but plan to have at least two domain controllers).
4. If TCP/IP is not already implemented, consider upgrading the servers to TCP/IP before you start; or consider setting up the first upgraded server (the former PDC) as a DHCP server (see Chapter 3) and use the default TCP/IP configuration for each upgraded server. Also, set up the first upgraded server to work as a DNS server (see Chapter 3), if one does not already exist on the network, such as via a UNIX server.
5. To begin the upgrade, use the Winnt32 program on the Windows 2000 Server CD-ROM as described in the section, “Installation from an Existing Operating System.”
6. Select Upgrade to Windows 2000 (Recommended) on the first screen in setup (see Figure 5-10) so that you can retain existing settings, including the Windows NT Security Accounts Manager (SAM) database information about accounts and groups, and software.
7. Follow the directions in the Windows 2000 Setup (see the section, “Stepping Through an Installation”).
8. During the upgrade, the Active Directory Wizard starts and provides the opportunity for you to specify if you want to join an existing domain tree or forest, or start a new one. Specify that you want to start a new one if you are upgrading the PDC; or join an existing one if you are upgrading a BDC — and provide the name of the domain.





**Figure 5-10** Selecting the upgrade option

9. The Active Directory Installation Wizard will upgrade the PDC or BDC to have Windows 2000 Server directory services and Kerberos authentication services. Also, it will convert the SAM in the Windows NT Registry to the database used by the Active Directory so that accounts, groups, and security information is retained. If you are upgrading a BDC that is to be set up as a child domain, then a Kerberos transitive trust is automatically created with the parent domain.
10. After you upgrade a PDC, it is still recognized by any Windows NT BDCs as the domain master and can synchronize with live BDCs until they are upgraded. Leave a BDC running until all servers are upgraded (except for the last server to be upgraded, of course), because this gives you a backup alternative if there is a problem. (If you are concerned about upgrade problems, create an extra BDC to match the last BDC before it is converted. Remove the backup BDC from the network and store it in a safe place until you feel assured the upgrade process is fully successful.)
11. Establish a Group Policy for the domain via the Active Directory (see Chapters 4 and 6), including logon restrictions.
12. After all servers are upgraded and there are no Windows NT servers connected to the domain, convert the domain (or all domains) to native mode, which reflects that there are no longer any Windows NT PDCs or BDCs on the network. You can do this by clicking the Start button, pointing to Programs, pointing to Administrative Tools, and clicking Active Directory Domains and Trusts. Right-click the domain you want to convert and click Properties. Click the Change Mode button on the General tab.

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## CREATING AN EMERGENCY REPAIR DISK

After Windows 2000 Server is installed, you can choose to create an **emergency repair disk (ERD)**, which enables you to fix problems that may arise with the server. Plan to create a new ERD each time you install software, make a server configuration change, install a new adapter, add a NIC, restructure a partition, or upgrade the operating system. You can create or update the ERD at any time after Windows 2000 Server is installed by starting the Backup Wizard and clicking the Emergency Repair Disk button (try Hands-on Project 5-5).

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## TROUBLESHOOTING INSTALLATION PROBLEMS

In most cases the installation goes smoothly, but installers sometimes experience problems. Often, difficulties are prevented by making the advance preparations explained earlier in this chapter and in Chapter 2, which include:

- Ensure you purchase a processor and hardware components that are on the Microsoft HCL.
- Test all hardware before installing Windows 2000 Server.
- Run the computer manufacturer's diagnostics before installing Windows 2000 Server.
- Run a comprehensive test of the hard disk to ensure it is functioning properly.

Sometimes prevention is not enough and installation problems occur. Most problems are related to hardware drivers or to the actual hardware. For example, the computer may contain a CD-ROM drive or display adapter that is newly marketed and not contained in the installation selection list. If Windows 2000 Setup does not contain the driver or it is not included on a disk with the hardware, it is necessary to contact the computer vendor for a new driver. Sometimes an adapter card, such as a NIC or hard disk adapter, is loosened when the computer is moved and the card simply needs to be reseated.

If SCSI adapters are used, the SCSI cable may be loose or it may not be properly terminated. A network interface card or sound card driver may be needed, since new models are often introduced to the market. Table 5-4 provides a list of problem descriptions and steps to take to solve the problems.

**Table 5-4** Troubleshooting a Windows 2000 Server Setup

Problem Description	Solution Steps
Installation fails when connecting to the domain controller	Make sure you have previously created an account in the domain and provided the right domain name. Also, make sure the computer is connected to the network, that the domain controller and DNS server are working, and that you are using the right protocol.
Setup did not find any mass storage devices on the computer. There is an Inaccessible Boot Device message.	<p>The most common cause is that Setup does not have a driver for a SCSI device or is detecting storage devices in the wrong order, such as the CD-ROM drive first. Press F6 when setup first starts and provide a driver for the mass storage device that will hold the Windows 2000 files.</p> <p>Check to make sure all adapters and controllers are working properly. Check power to all devices. Reseat adapters and controllers.</p> <p>For SCSI devices ensure: (1) The SCSI cabling is properly installed, (2) SCSI devices are terminated, (3) SCSI devices are correctly addressed, and (4) the BIOS correctly recognizes all SCSI adapters. Also, be sure the SCSI boot drive is addressed as 0. Check the manufacturer's recommendations for configuring SCSI adapters and hard disk drives. Try replacing the adapter before replacing the drive(s).</p> <p>For EIDE drives: (1) Check the controller, (2) ensure file I/O and disk access are set to standard, and (3) ensure the system drive is the first device recognized by the controller.</p> <p>For IDE and ESDI drives: (1) Check the cabling and controller, (2) check the drive setup in the BIOS for master/slave relationships, (3) ensure the drive is properly recognized in the BIOS.</p>
You see the STOP Message "0x00000000 IRQL Not Less or Equal," or you see a message that there is a problem with the HAL.DLL.	Restart the installation and press F5 as soon as possible. Select the appropriate computer type for a single processor or select Other for an SMP computer and load the HAL.DLL that is available from the computer vendor.

**Table 5-4** Troubleshooting a Windows 2000 Server Setup (continued)

Problem Description	Solution Steps
The installation fails when installing the network components.	Go back to configure network settings. Make sure you have installed a protocol that is appropriate for your network and that you have provided all the information needed to set up the protocol. Check the network interface card to ensure it is working. Reseat or replace the card and start Setup again. Use the diagnostic software provided with the card to test for problems. If this does not work, try a card from a different manufacturer, in case there is a hardware incompatibility.
A problem is reported with NTOSKRNL.EXE or in finding NTLDR.	The Boot.ini file needs to be changed to indicate where to find Windows 2000 (if other than on the primary system drive) or NTLDR is not on the drive used to boot (called the system drive).
A device driver is not available in Setup for a given component, such as a NIC, sound card, video card, or other adapter.	Obtain the most recent driver from the manufacturer.
A STOP message appears during the installation.	Start the installation again. If the STOP message appears a second time, record the message and consult a Microsoft technician. (Also, see Chapter 16 For STOP message solutions.)
Computer locks up	Check the IRQ and I/O settings for conflicts among hardware components and cards (check the NIC and any specialized cards in particular).

## INSTALLING SERVICE PACKS

Service packs are used to provide additional capabilities, update the operating system, and to fix reported problems in Windows 2000 Server. When a service pack is issued, it is prudent to obtain the service pack and install it. Typically service packs are issued in version sequences, such as Service Pack 1, Service Pack 2, and so on. When a later version service pack is installed, it is necessary to have the first versions installed as well. Microsoft takes the work out of remembering by including earlier service pack versions in the latest version. For example, when you install Service Pack 3, you are also installing Service Packs 1 and 2, so you can miss an early service pack and still make sure all versions are installed via a later one. If you have installed a service pack and afterward make a change in Windows 2000 Server, you should reinstall all or a portion of the service pack. For example, if you remove and reinstall TCP/IP, then you should reinstall the portion of the latest service pack that affects TCP/IP, which is an installation process called **slip streaming**. You can order service packs online through

Microsoft's Web site at [www.microsoft.com](http://www.microsoft.com); and often Microsoft makes service packs available as a free download from its Web site. The general steps for installing a service pack are:

1. Back up the server and make an ERD before you start, as a precaution.
2. Download the service pack contents to a folder on the server or obtain the service pack CD-ROM and insert it. Make sure that you have the 128-bit encryption version for Windows 2000 Server systems for purchased in the United States and Canada.
3. Read the instructions for using the service pack. For example, they may ask that you temporarily deactivate certain third-party drivers (you learn this in Chapter 6). Also, the instructions will tell you how much disk space is needed for the installation.
4. Close all active windows.
5. Start the service pack upgrade by clicking Start and Run. Enter the path to the service pack files and Setup.exe or SpSetup.bat in the Run dialog box, such as D:\Setup.exe. (You can also install a service pack over a network, which requires accessing a shared folder and using the command, Update.exe.)
6. Follow the on-screen instructions in the Setup program to install all of the service pack or to slip stream only a specific element of the service pack.

When you install a service pack, it is possible to uninstall it and go back to the system as it was before the install. If you want the ability to uninstall the service pack, make sure you have twice the required disk space before you start the installation (for the installation files and to save your old files). Perform the installation using the Update.exe program instead of Setup.exe or SpSetup.exe. Table 5-5 shows the typical switches for the Update program. If a problem occurs and you want to uninstall the service pack, use the Control Panel Add/Remove Programs icon (see Chapter 6). Should the installation fail prematurely, because of a power failure for example, and before the service pack is registered in Add/Remove Programs, you can uninstall it by running Spuninst.exe from the temporary folder that the Update program creates on the server's hard drive.

**Table 5-5** Windows Service Pack Update Switches

Switch	Purpose
- f	Close all programs when the operating system shuts down prior to rebooting
-n	Disable the backup of old files used to uninstall the service pack
-o	Automatically copy new files over the old OEM files
-q	Install using the quiet mode so that the user does not have to respond to prompts during the installation
-u	Install using the unattended mode
/?	List the available switches



Some Windows 2000 Server updates are available online, using the Windows Update option. Click Start and then click the Windows Update option. If you have not already configured an Internet connection, click Connect Me to the Internet. If you have previously configured a connection, the tool automatically connects to the Microsoft Web site and performs the upgrade. Consult the web site at [www.microsoft.com](http://www.microsoft.com) for information on the latest updates and service packs for Windows 2000 Server.

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## UNINSTALLING WINDOWS 2000 SERVER

Sometimes it is necessary to uninstall Windows 2000 Server, for instance when new server hardware is purchased and you want to pass along the old hardware to someone else. For example, to remove Windows 2000 Server and install Windows 98 you might do the following steps:

1. Purchase a new copy of Windows 98 or use the disks from a licensed copy not presently used by someone else.
2. Perform a complete backup of all files on the server computer.
3. If the computer is not set to boot from drive A first, start the BIOS setup program and set it to boot from drive A before trying to boot from drive C (consult the computer documentation on how to use its BIOS setup program).
4. Power off the server and insert the Windows 98 boot disk or CD-ROM, or boot from a Windows 98 Startup disk that you have made previously.
5. Boot the computer from the Windows 98 boot disk or Startup disk.
6. Use the FDISK and FORMAT utilities on the boot disk to delete the NTFS partition and to partition the workstation drive(s) for FAT16 or FAT32 and to format the drive(s).
7. Use the Windows 98 CD-ROM to install the operating system.
8. Install the appropriate applications software and data files on the computer.

If your version of FDISK cannot delete the NTFS partition, an alternative is to insert the Windows 2000 Server CD-ROM or Setup Disk #1 and start an installation. When Setup identifies the existing NTFS partition, highlight the partition and type *D* to delete it. Next, exit the installation, use the Windows 98 CD-ROM (or the installation disks for another operating system) to install the operating system.

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## CHAPTER SUMMARY

- Planning is often the best preparation for any task, and this rule holds true for installing Windows 2000 Server. The best planning steps that you can take are to select a computer and components from the Microsoft HCL that are equipped to handle the anticipated server load in your organization. Also, your preparations should include decisions about

how to partition the disk storage, which file system to use, what to name the server, what protocol to set up, which licensing method to use, and how to access the network.

- Windows 2000 Server can be installed using any of several methods, which include: using the CD-ROM only, using the installation floppy disks and CD-ROM, installing over a network, or installing from an existing operating system. Fortunately, the installation follows a logical step-by-step process that automates many activities—detection of the disk storage and NIC, for example. Although you may need to troubleshoot a specific installation problem, the likelihood of having to deal with a problem is reduced in proportion to how well you have planned in advance.
- One important task after you have completed the installation is to make an emergency repair disk that you update each time you change the server configuration. Also, watch for service packs issued by Microsoft and plan to install them.

Other setup tasks are ahead as you set up a server to match your organization's needs. These tasks begin in the next chapter, which focuses on configuring additional server elements, particularly through the Control Panel.

## KEY TERMS

**answer file** — A text file that contains a complete set of instructions for installing Windows 2000 in the unattended mode.

**basic input/output system (BIOS)** — A program on a read-only or flash memory chip that establishes basic communication with components such as the monitor and disk drives. The advantage of a flash chip is that you can update the BIOS.

**client access license (CAL)** — A license to enable a workstation to connect to Windows 2000 Server as a client.

**dual-boot system** — A computer set up to boot from two or more different operating systems, such as Windows 2000 Server and MS-DOS.

**emergency repair disk (ERD)** — A disk that contains repair, diagnostic, and backup information for use in case there is a problem with Windows 2000.

**format** — An operation that divides a disk into small sections called tracks and sectors for the storage of files.

**hardware abstraction layer (HAL)** — A set of program routines that enables an operating system to control a hardware component, such as the processor, from within the operating system kernel.

**member server** — A server that is a member of an existing Windows 2000 domain, but that does not function as a domain controller.

**partition** — A process in which a hard disk section or a complete hard disk is set up for use by an operating system. A disk can be formatted after it is partitioned.

**per seat licensing** — A server software license that requires that there be enough licenses for all network client workstations.

**per server licensing** — A server software license based on the maximum number of clients that log on to the server at one time.

**slip streaming** — Installing only a specific portion of a service pack instead of the entire update.

**standalone server** — A server that is not a member of a domain, but that is a member of an existing workgroup or that establishes its own workgroup, such as in peer-to-peer networking.

**uniqueness database file (UDF)** — A text file that contains an answer set of unique instructions for installing Windows 2000 in the unattended mode and that is used with an answer file.

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## REVIEW QUESTIONS

1. You are installing Windows 2000 Server and get a message that it cannot log on to the domain. Which of the following should you check?
  - a. that there is an active domain controller on the network
  - b. that you have configured the new server to use the same protocol as is used by the DNS server on the network
  - c. that NetBEUI is configured for 802.2 frames on the new server
  - d. all of the above
  - e. only a and b
  - f. only a and c
2. You are installing Windows 2000 Server on a computer that already has Windows 98 installed. What setup command can you use to install Windows 2000 Server and which command option enables you to create a log of any installation errors?
  - a. Winnt with the /e option
  - b. Winnt with the /log option
  - c. Winnt32 with the /debug option
  - d. Winnt32 with the /cmd:error.log option
3. In what file would you find the ARC path used to boot Windows 2000 Server?
  - a. Boot.ini
  - b. Io.sys
  - c. Command.com
  - d. NTLDR
4. What disk and partition on that disk contain the operating system files when the ARC path is scsi(1)disk(1)rdisk(0)partition(2)?
  - a. third disk and third partition on that disk
  - b. second disk and first partition on that disk
  - c. second disk and second partition on that disk
  - d. third disk and second partition



5. When you install Windows 2000 Server you must join
  - a. a domain
  - b. a workgroup
  - c. an account group
  - d. all of the above
  - e. either a or b
  - f. either a or c
6. When you set up Windows 2000 Server for network communication, what protocol(s) is (are) used by Setup as part of the default, or typical, installation?
  - a. TCP/IP
  - b. NetBEUI
  - c. NWLink
  - d. all of the above
  - e. only a and b
  - f. only a and c
7. What element is needed to perform an unattended installation for Windows 2000?
  - a. at least 125 MB of RAM
  - b. an answer file
  - c. 10 client access licenses, instead of 5
  - d. a RAM disk installed to store unattended database information
8. You are installing Windows 2000 Server on a dual-processor system, but the installation is having trouble recognizing the mass storage. What might be the problem?
  - a. The processors are operating at different speeds.
  - b. Setup does not have a driver for the SCSI adapter used for the mass storage.
  - c. You need to start the processor service before completing the installation.
  - d. Windows 2000 Server can only be used on a system that has just one SCSI adapter, and this system has two.
9. Which of the following is (are) installation options used with Windows 2000 Server?
  - a. CD-ROM installation
  - b. over the network installation
  - c. floppy disk only installation
  - d. all of the above
  - e. only a and b
  - f. only a and c

10. You have installed a dual-boot system consisting of Windows 98 using a FAT32 partition and Windows 2000 Server using an NTFS partition. You have checked your Windows 2000 installation and it looks good. However, when you boot Windows 98, you cannot see the files on the NTFS partition. What might be the source of the problem?
  - a. Windows 98 is not compatible with NTFS; thus, this result is normal.
  - b. You have not switched on Windows 98 file sharing.
  - c. You must run NTLDR just after starting Windows 98 in order to view the NTFS partition.
  - d. all of the above
  - e. only a and c
  - f. only b and c
11. You have chosen to use the Windows 2000 Setup process to partition a 6 GB disk for FAT. Which file system version will be used by Setup?
  - a. Setup can only partition disks over 2 GB using NTFS, not FAT.
  - b. Setup will partition using FAT16.
  - c. Setup will partition using FAT32.
  - d. Setup will partition the first 2 GB for FAT32 and the remaining 4 GB for NTFS.
12. When you run Windows 2000 Setup in attended mode, which of the following are true in the initial stages of the process?
  - a. You must accept the licensing agreement to proceed.
  - b. Setup only detects unpartitioned space on hard disks attached to the computer.
  - c. Setup automatically deletes any operating systems already on the computer.
  - d. all of the above
  - e. only a and b
  - f. only b and c
13. Which of the following are components that can be installed by Windows 2000 setup?
  - a. Other Network File and Print Services
  - b. Management and Monitoring Tools
  - c. Message Queuing Services
  - d. all of the above
  - e. only a and c
  - f. only b and c
14. As you are installing Windows 2000 Server, the computer locks up. When you reboot, the installation process starts for a short time and then the computer locks up again. What can you do to resolve the problem?
  - a. Check for a conflict in the IRQ settings of the hardware installed in the computer.
  - b. Press F10 when you reboot the computer and temporarily remove the NIC driver.

- c. Press F7 to have Setup reconfigure the hardware to the lowest common denominator.
  - d. Make sure that you have at least 8 MB of RAM installed in the computer.
15. An emergency repair disk (ERD) can be created
- a. only when you install Windows 2000.
  - b. by using the Backup Wizard.
  - c. by using the edisk utility.
  - d. by using the ERD utility on the Administrative Tools menu.
16. A friend of yours is trying to set up Windows 2000 Server on a computer that he purchased from a local dealer, who builds them from various parts available through mail-order catalogs and the Internet. Unfortunately, Windows 2000 Server is having trouble installing on this computer during the text-based portion of the setup. What advice would you give?
- a. Use only generic drivers for hard disk storage.
  - b. Use the custom components setup in Windows 2000 Server.
  - c. Replace the computer with one that is on the HCL.
  - d. Call Microsoft to obtain new Windows 2000 drivers.
17. You have installed Windows 2000 Server, and after the installation you discover that you have lost the floppy setup disks. What is the best option for replacing the disks as soon as possible?
- a. Call Microsoft for replacement disks.
  - b. Run Winnt /O from the Windows 2000 Server CD-ROM.
  - c. Run Makeboot from the Windows 2000 Server CD-ROM.
  - d. Don't worry, you will never need these disks again.
18. You are setting up Windows 2000 server for an investment firm that has 14 network clients. What licensing method would you use?
- a. per server
  - b. per seat
  - c. per network segment
  - d. per process
19. A standalone server is one that
- a. belongs to a domain.
  - b. acts as a DC.
  - c. authenticates logons in a single domain.
  - d. all of the above
  - e. none of the above
  - f. only b and c

20. When you install Windows 2000 what must you do to the disk that will hold the operating system files?
  - a. Partition and format the disk.
  - b. Select the disk spindle, since there are two.
  - c. Determine the number of sectors to use on the disk.
  - d. all of the above
  - e. none of the above
  - f. only a and b
21. Which of the following operating systems can coexist on the same computer with Windows 2000 Server?
  - a. Windows 95
  - b. MS-DOS
  - c. Windows 98
  - d. all of the above
  - e. none of the above
  - f. only a and c
22. The Windows 2000 Server operating system files are located on a SCSI disk with the BIOS enabled and are on the third partition of that disk. This disk is the third disk on the SCSI adapter. Which of the following is its ARC path?
  - a. scsi(0)disk(2)rdisk(3)partition(2)
  - b. multi(0)disk(4)rdisk(0)partition(2)
  - c. multi(0)disk(2)rdisk(0)partition(3)
  - d. scsi(1)disk(3)rdisk(3)partition(2)
23. You have installed Windows 2000 Server and later decide to change the NIC and install another disk drive. Which of the following should you do after these devices are installed?
  - a. Reinstall Windows 2000 Server from the CD-ROM.
  - b. Reset the security access to the NIC.
  - c. Make a new emergency repair disk.
  - d. Bind the NIC to the hard drive so both are recognized by Windows 2000 Server.
24. Which of the following is the most useful password recommendation for when you configure the Administrator account during the Windows 2000 setup?
  - a. Do not enter a password at this time because you might forget it and be unable to access the new server.
  - b. Do not confirm the password because confirmation causes it to be copied to the Guest account.
  - c. Use a relatively long password that is hard to guess.
  - d. Use a password that is entirely numeric like a combination lock. This is required by Windows 2000 Server to keep the Administrator account more secure than others.

25. You insert the Windows 2000 CD-ROM to install the operating system on a computer; however, when you power off the computer and reboot, the computer tries to boot from the hard drive, which has no files. Which is your best option?
  - a. Set the BIOS boot order to start with the CD-ROM drive.
  - b. Temporarily unplug the hard drive from its controller before starting the installation.
  - c. Boot from Setup Disk #2 in drive A, which is designed to start the CD-ROM setup programs.
  - d. Change the CD-ROM drive speed to at least 24X.

## HANDS-ON PROJECTS



### Project 5-1

In this hands-on activity you view the switches that can be used with the Winnt32 installation program. You will need the Windows 2000 Server CD-ROM.

#### To view the switches:

1. Start any one of the following computer operating systems: Windows 95, Windows 98, Windows NT 4.0, or Windows 2000.
2. Insert the Windows 2000 Server CD-ROM in the CD-ROM drive.
3. Click **Start** and then **Run**.
4. Enter the drive letter and path of the winnt32 file in the Open box and enter `/?` after the command as in: **D:\i386\winnt32.exe /?** (winnt32 is located on the Windows 2000 Server CD-ROM in the \i386 folder for Intel-based computers). Click **OK**.
5. What switch would you use to have a Recovery Console option? What switch enables you to create an error log to review installation errors? Record your observations in a lab journal or in a word-processed document.
6. Close the Windows Help dialog box.



### Project 5-2

In this activity you practice installing Windows 2000 Server using the CD-ROM only method.

#### To practice the installation:

1. Go back to the section in this chapter entitled “CD-ROM Installation” and follow those steps.
2. Skip to the section in this chapter entitled “Installation Part 1” and follow the steps.
3. Continue by following the steps in the section entitled “Installation Part 2.”
4. Log on to Windows 2000 Server to test your work.



## Project 5-3

In this hands-on activity, you practice creating a shared folder from which to load Windows 2000 Server over the network. You need a computer running Windows 2000 Server or Professional, and the Windows 2000 Server CD-ROM.

**To create a shared folder from which to install Windows 2000 Server over the network:**

1. Log on to Windows 2000 Server as Administrator.
2. Insert the Windows 2000 Server CD-ROM in the computer.
3. Click **Start**, point to **Programs**, point to **Accessories**, and then click **Windows Explorer**.
4. Use Windows Explorer to create a new folder on drive C (or another drive) called Win2000 by clicking the **File** menu, pointing to **New**, and then clicking **Folder**. Enter **Win2000** as the name of the new folder.
5. Click the CD-ROM drive in Windows Explorer, right-click the **I386** folder and drag it to the Win2000 folder. Click **Copy Here** on the shortcut menu.
6. Right-click the **Win2000** folder and then click **Sharing**.
7. Click the **Share this folder** radio button and, enter a share name, such as **Win2000**.
8. Click the **Permissions** button and give the Everyone group **Read** permission only (remove the checks from the other permissions). Click **OK** and then click **OK** again.

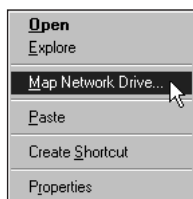


## Project 5-4

In this activity you practice the steps to run an installation over the network from the shared folder you created in Project 5-3. Access the shared folder from a computer running Windows 95, Windows 98, or Windows NT.

**To practice the installation:**

1. Double-click **Network Neighborhood**.
2. Locate the Windows 2000 server that is sharing the Win2000 folder, and double-click it.
3. Right-click the **Win2000** folder and then click **Map Network Drive** (see Figure 5-11). (Make sure Windows 95 and Windows 98 are set up for User-level access control.)



**Figure 5-11** Mapping a drive

4. In the Map Network Drive dialog box, enter the letter of a drive that is not already mapped, and then click **OK**.

5. Click **Start**, click **Run**, and then click the **Browse** button.
6. Find the Win2000 shared folder.
7. Find and click **Winnt32** so that it appears in the File name text box and then click **Open**.
8. Click **Cancel** so that you do not actually start the installation.



## Project 5-5

In this project, you create an emergency repair disk. Have a FAT-formatted floppy disk ready in advance.

5

### To create the ERD:

1. Click **Start**, point to **Programs**, point to **Accessories**, point to **System Tools**, and then click **Backup**.
2. Insert the floppy disk.
3. Click **Emergency Repair Disk** and then click **OK** (see Figure 5-12).

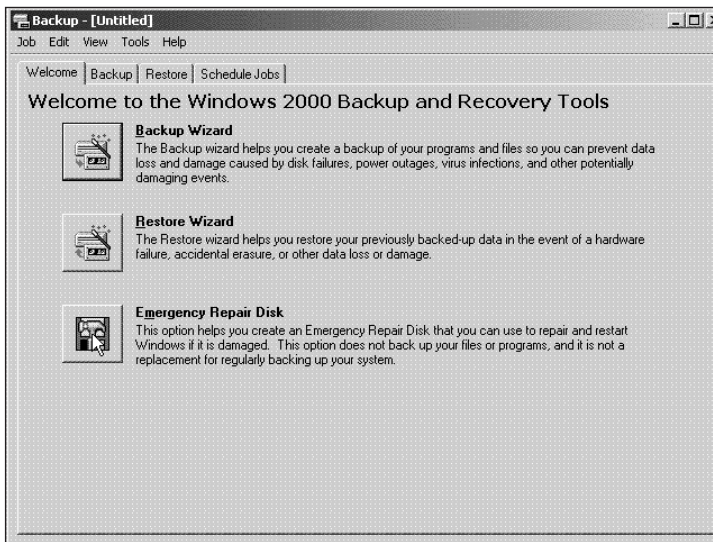


Figure 5-12 Backup Wizard

4. Click **OK** again and close the Backup utility.
5. Click **Start**, point to **Programs**, point to **Accessories**, and then click **Windows Explorer**.
6. Use Windows Explorer to view the files created on the ERD in drive A. Open the Setup.log file using Notepad and examine its contents. Record your findings in a lab journal or in a word-processed document.
7. Close Notepad and close Windows Explorer.

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## CASE PROJECT



### Aspen Consulting Project: Installing Windows 2000

Internal Medicine Associates is a physicians group that has contacted you to install Windows 2000 on their new server. This physicians group consists of 55 doctors, nurses, and staff members who each have a computer that will soon be networked. They also have purchased a dual-processor Pentium III server that has two 20-GB drives on a new state-of-the-art SCSI adapter, 512 MB of RAM, a NIC, and an ISDN (telecommunications) adapter for high-speed Internet connectivity. One reason for the Internet connectivity is to access research databases and medical school sites that provide multimedia physician education services. The server will be used to store patient records, billing information, and application software. It also will serve as a central location from which to load and upgrade software at each client, such as Microsoft Office updates.

1. Before you install Windows 2000 Server, what preparations and decisions will you make?
2. When you install Windows 2000 Server, will you join an existing domain or a work-group? Why?
3. What installation method will you use? Why? What other installation methods might be appropriate in this situation?
4. When you start the installation, Windows 2000 Server does not recognize the SCSI adapter and the disk storage attached to the adapter. What steps can you take to solve the problem?
5. After you have completed the installation, you accidentally drop one of the setup disks, and the plastic disk cover breaks. You decide to make a new set of the floppy installation disks and to show the group's office manager how to make them. Explain how you can make the new disks. Also, explain why it can be important to have these disks.
6. Once the new installation disks are made, you realize that you should show the office manager how to make an ERD. Explain how this is done and if there is any reason to make other ERDs in the future.

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## OPTIONAL CASE PROJECTS FOR TEAMS



### Team Case One

Mark Arnez asks you to form a group to create documentation for the other consultants about installing Windows 2000 Server. In the documentation, he wants you to explain a scenario for installing Windows 2000 Server in a small office environment like Internal Medicine Associates, and another scenario for an organization that is much larger, such as a corporation or college. From these scenarios, he wants your group to make some general guidelines explaining how to prepare for an installation in a small context as compared to a large context.



### Team Case Two

Your documentation for Team Case One has impressed Mark. Now he wants you to supplement it with a detailed list of do's and don'ts for installing Windows 2000 Server.